

# <sup>®</sup>SPECTRA

PROFESSIONAL AND  
COMBI-500 EXPOSURE METERS



## INTRODUCTION

Congratulations, and welcome to the world of SPECTRA. You are in distinguished company. SPECTRA meters are used by knowledgeable professionals the world over; from the swamps of Asia to the fashion studios of New York; from the movie studios of Hollywood to the industrial plants of Europe.

SPECTRA INCIDENT-LIGHT meters are so called because they measure all the light falling on — or **incident** upon, the subject. (For a detailed explanation of the principle of Incident-Light ask your dealer for the PHOTO RESEARCH publication "**Incident-Ly**"). Now, get the "feel" of your meter. Twist the swivel head, note how you can point it in any direction while reading the meter scale. Examine the meter scale, the upper numbers indicate footcandles, the lower number f/stops. Insert a multiplying slide, note its effect on the meter reading, try an ASA INDEX slide.

Look at the white Photosphere. Since the Photosphere receives all the light falling on the subject, it is an almost perfect 3-dimensional duplicate of the subject. Remove the Photosphere and see the light sensitive area underneath. Now that you have "met" your meter we suggest you make some actual tests on film. Experienced photographers know that all variables must be considered when determining correct exposure . . . film sensitivity, actual shutter speed, lens apertures, lens transmission, processing.

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Take time to make and record some tests. This will help you control or eliminate the variables and enable you to get accurate and dependable results out of your exposure meter/camera combination.

If you are used to a reflected-light meter the change to an incident-light meter may require a slight mental adjustment. You will find it much easier and quicker to take readings. Your exposures will be more consistently accurate and the troublesome "angle of acceptance" associated with reflected-light meters need no longer be considered.

### **POINTER LOCK:** (Figure 5 — Page 17)

Some SPECTRA meters are fitted with a pointer lock device. The Pointer Lock button (11) is located on the front of the meter immediately under the name plate.

In the normal position the meter is locked.

**NOTE:** It is good practice to lock the pointer whenever meter is being shipped or is not in use.

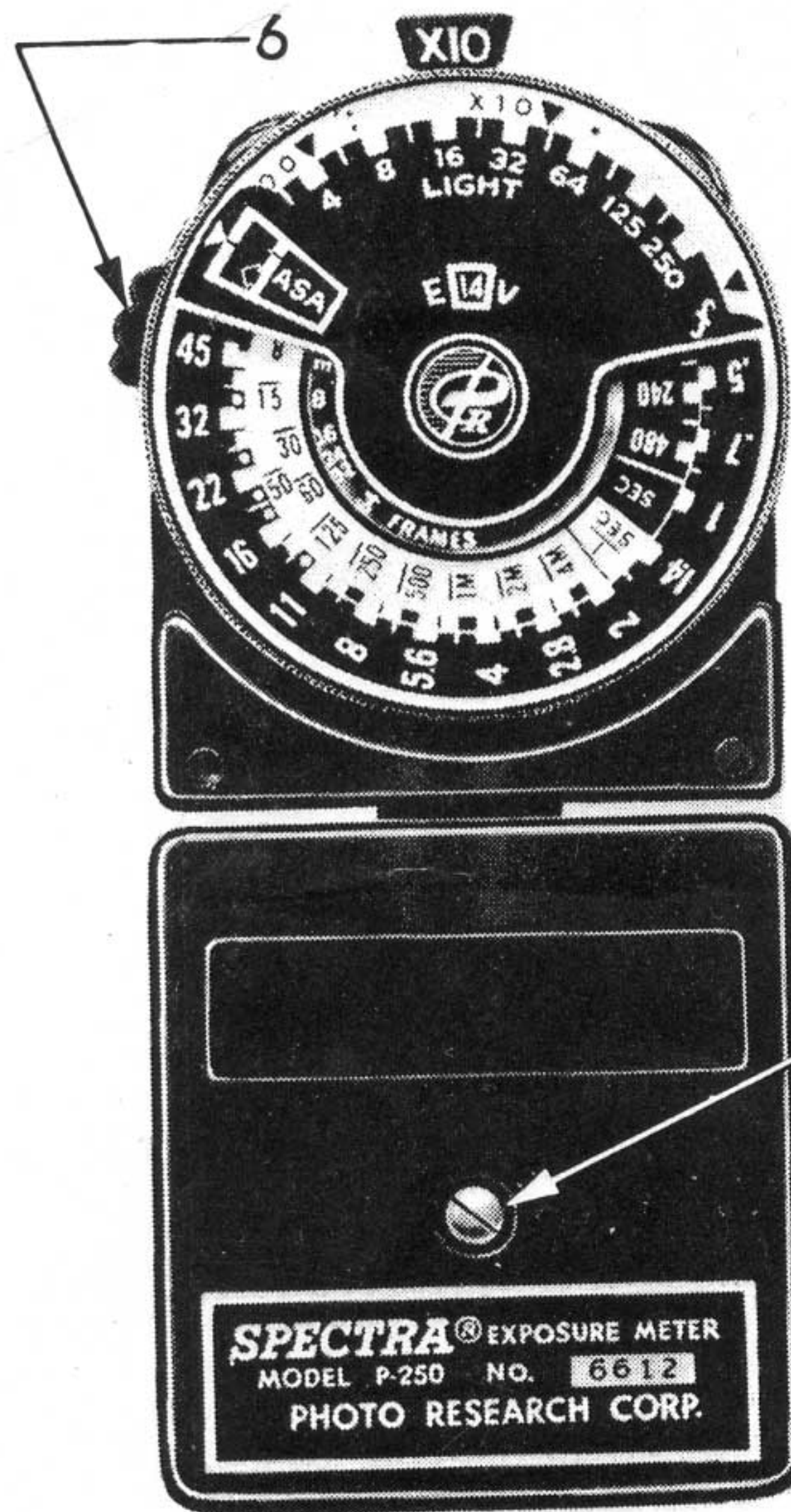
#### **To Use Pointer Lock:**

- 1) Gently press down red button.
- 2) Take reading while holding down button.
- 3) Release button to hold reading.

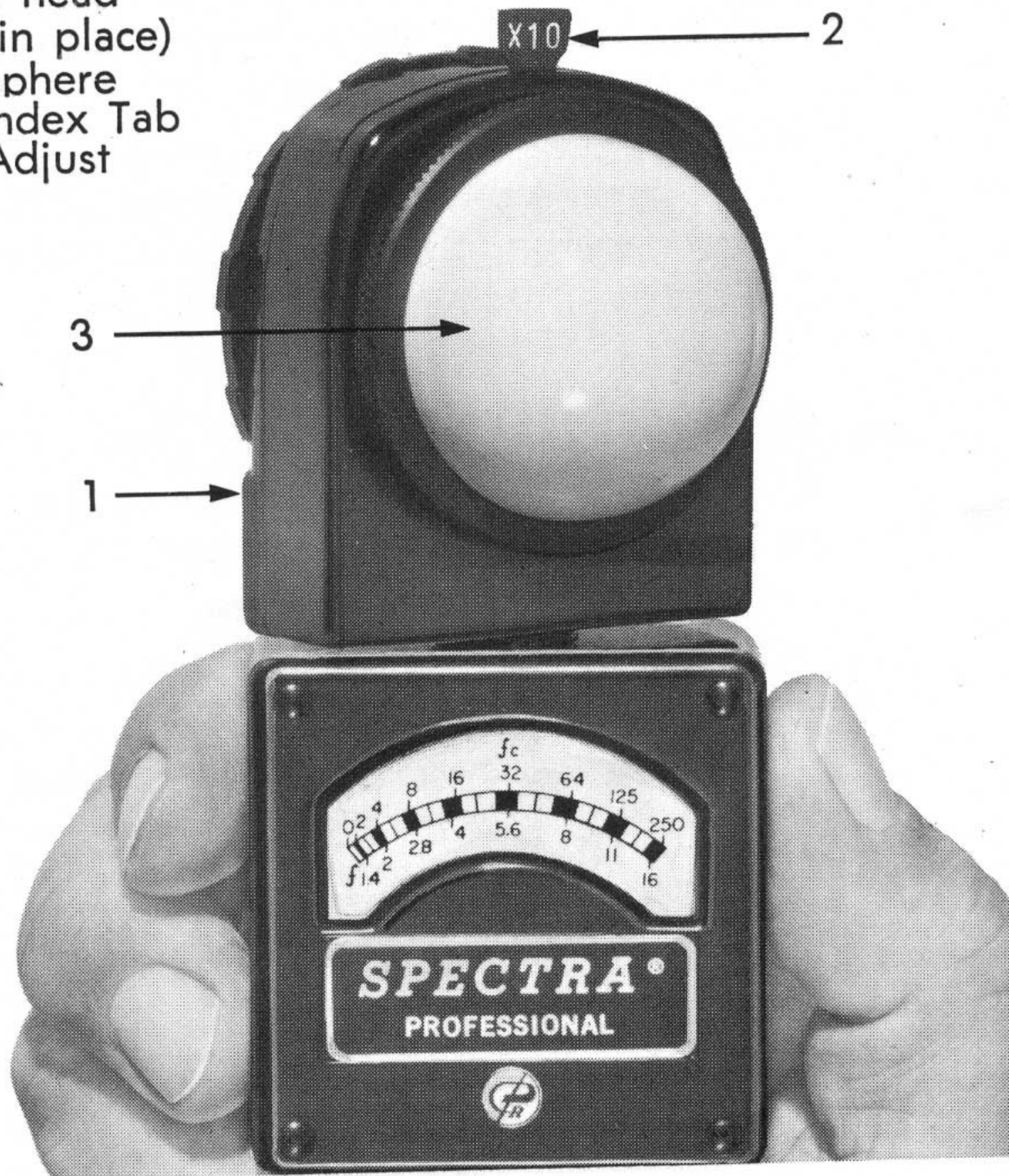
#### **To Disengage Lock:**

- 1) Gently press down red button and . . .
- 2) Rotate button  $\frac{1}{4}$  turn clockwise.  
Reverse procedure to re-engage lock.





- 1 Swivel head
- 2 Slide (in place)
- 3 Photosphere
- 6 ASA Index Tab
- 7 Zero Adjust





## **ZERO AND BALANCE:**

All meters are correctly balanced and zeroed before leaving the factory. Zero adjustment should not be changed unless meter goes off zero.

### **TO CHECK ZERO: (Figure 1 — Page 4)**

- A) Insert blank slide in meter.
- B) Lay meter down on flat surface.
- C) Meter should indicate "O" precisely.

If adjustment is required, turn ZERO adjustment screw (7) as needed.

### **TO CHECK BALANCE:**

- A) Insert blank slide.
- B) Hold meter in operating (upright) position.
- C) Meter should indicate "O."

If meter is off balance, see your SPECTRA dealer or have your service man adjust it, otherwise inaccurate readings may result.

### **SWIVEL HEAD: (Figure 1 — Page 4)**

The swivel head (No. 1) may be turned almost 360°. This allows unobstructed use of the photocell while, at the same time, permitting a full view of meter scale.

**CAUTION:** When using swivel head, DO NOT FORCE IT BEYOND BUILT-IN STOP POINTS!

# METER SCALE INTERMEDIATE VALUES

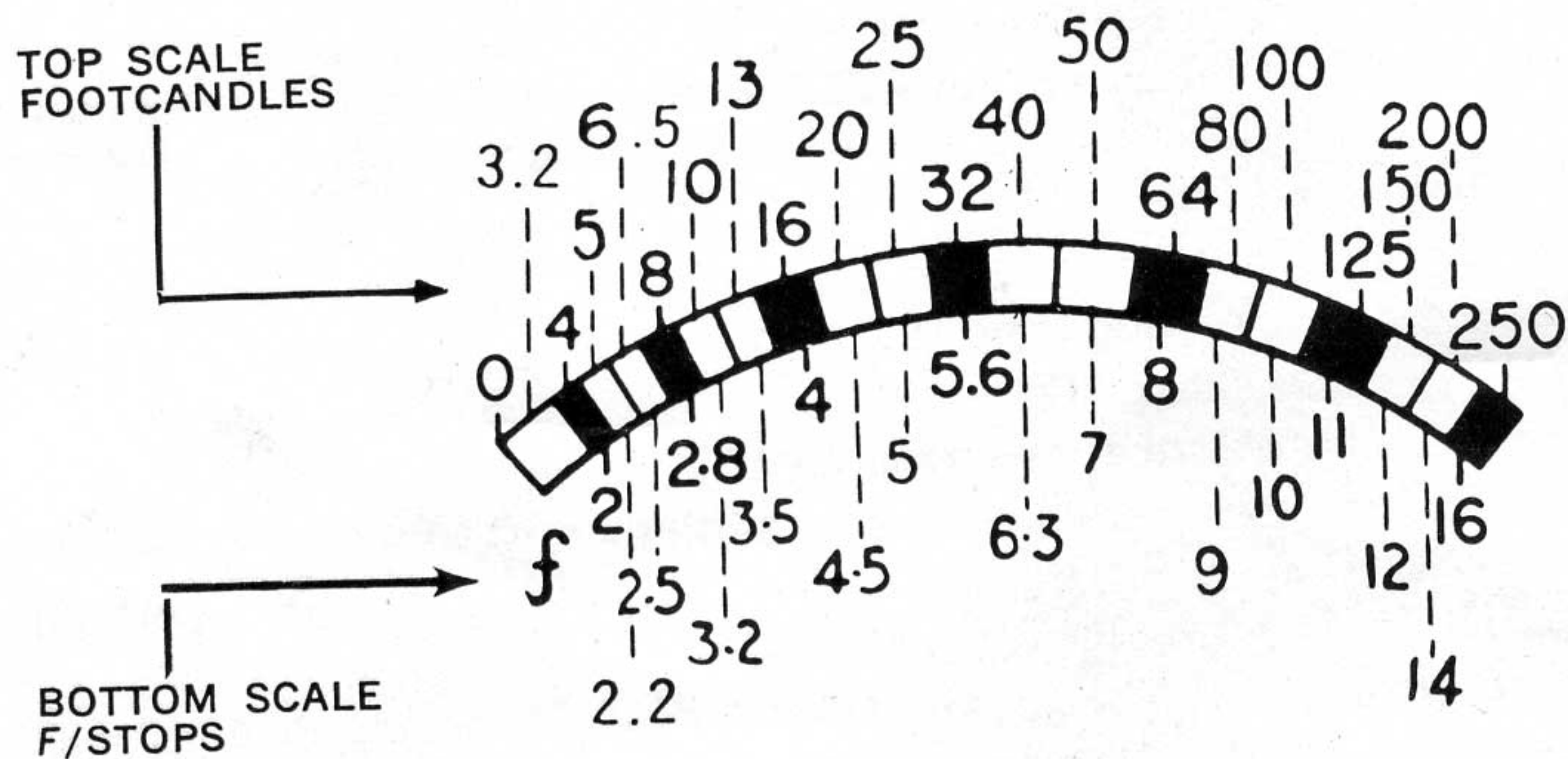


Figure 2



## **METER SCALE:** (Figure 2 — Page 6)

Your SPECTRA has a dual meter scale — footcandles on the top and f/stops on the bottom. As you will see, this is a very useful feature of your meter.

**NOTE WELL THIS RULE:** Read f/stop scale **only** when an **ASA slide** is in meter.

For reading intermediate values on the meter scale, refer to Figure 2—Page 6.

## **HOW TO MEASURE INCIDENT LIGHT (PHOTOSPHERE):**

Hold SPECTRA Meter at position of principal subject (or interest-center of scene) and point Photosphere directly at camera lens. **DO NOT POINT PHOTOSPHERE AT SUBJECT.** Rotate Photosphere to avoid shadows or reflections from photographer's clothing. Body of meter may be rotated for convenience without affecting reading as long as Photosphere points at camera lens.

Follow this general procedure:

- 1) The meter is held with the meter-scale toward the user.
- 2) The swivel head is turned and pointed directly at the light being measured.
- 3) When light level is too high (pointer goes over scale) a **MULTIPLIER** is inserted in slot in swivel head.

For specific techniques and use of ASA slides for direct reading see Page 9.

Readings may also be taken near camera so there is no need to approach the subject. This is especially useful in hazardous situations, or in distant scenes. make certain that the *light falling on the Photosphere is the same as the light falling on the subject, as the camera "sees" it.*

**NOTE:** The Photosphere collects all light falling on subject and integrates it into one overall reading. (For **balancing** light, see Page 14.)

## **MEASURING REFLECTED LIGHT (WITH PHOTOGRID):**

When the Photosphere is replaced with the Photogrid (see Accessories, Page 22), the SPECTRA becomes a reflected light meter. This method is recommended when it is impractical to use the Incident-Light method. DO NOT USE ASA SLIDES WITH THIS METHOD.

### **Procedure:**

- 1) Remove Photosphere and snap Photogrid on meter.
- 2) Point Photogrid AT THE SUBJECT and note reading. For black and white photography the shadow areas are generally the most critical. In color, the highlight areas call for the most careful reading, as they will "wash out" if overexposed.
- 3) Compute the exposure as detailed on Pages 11-13, using the Reference "DOTS" on the Computer.



## **SLIDE SYSTEM:**

An important feature of your SPECTRA is its unique SLIDE SYSTEM. Slides furnished with your meter are part of the calibration of this meter and should not be used with any other.

**NOTE:** Direct reading without slide = 1200 ASA @ 1/50 second.

There are two basic types of slides:

- 1) ASA Index slides and,
- 2) Multiplying slides.

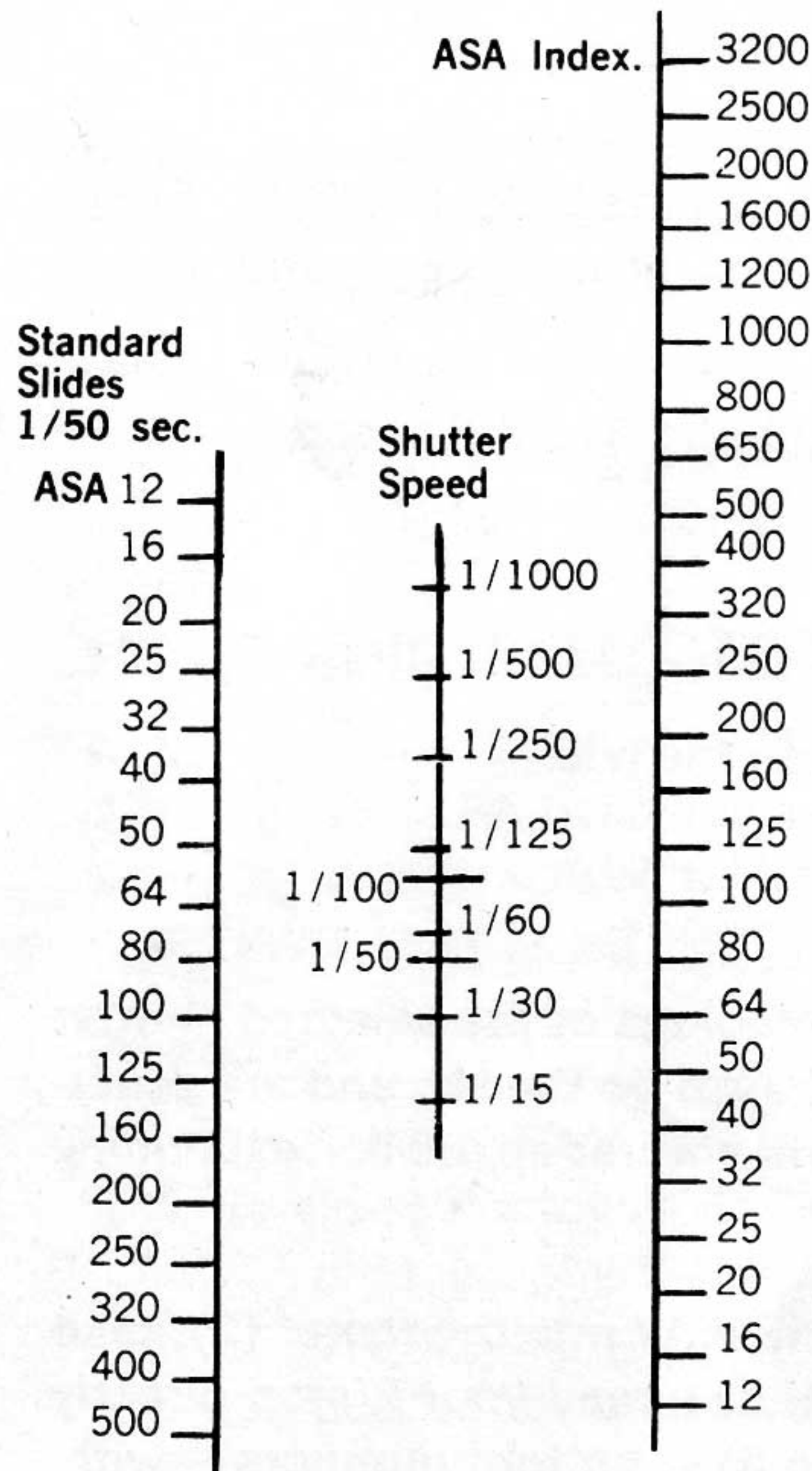
It is important to understand the difference between the two.

## **ASA SLIDES:**

ASA slides program your meter for direct f/stop readings at pre-selected shutter speeds. These slides have the film ASA index engraved on the tab and are generally (though not always) calibrated for 1/50 second shutter speed corresponding to standard 24 f.p.s. on motion picture cameras.

**TO USE:** Insert the appropriate slide ALL THE WAY into the meter (2), take reading in the usual way (Page 7), and read your f/stop directly from meter scale (Figure 2 — Page 6) — bottom numbers — without referring to the computer.





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## Other Speeds:

Although the standard ASA slides are for 1/50 second, each slide may be used for a variety of ASA and shutter-speed combinations.

The Spectra Slide Nomograph indicates which slide to use for different shutter speeds.

## SPECTRA SLIDE NOMOGRAPH

To use: 1. Run a line from your film ASA (right column) through selected shutter speed (center column).

2. The correct standard slide to use is indicated at point where line crosses left column.



## MULTIPLIERS:

Multiplying slides are used when the light level is greater than the full scale meter reading of 250 fc. The X10 is generally used for brightly lit interiors, studios, etc., and the X100 for daylight outdoors. With Combi-500 a special Red X10 slide is provided for use with Booster. Multiplying slides are used with the footcandle (upper) scale (Figure 2) and the marks X10 or X100 on the computer (Figure 3). They cannot be used for direct f/stop reading, but note the following important exception. On each multiplying slide an ASA number is also engraved; X100 has 12 ASA, X10 has 125 ASA, making these **dual purpose** slides. When these slides are used for their ASA values, **and not as multipliers**, you may read the f/stop direct, as you would with any standard ASA slide.

## READING METHODS:

There are two methods of obtaining a reading on the SPECTRA meter: The DIRECT method and the COMPUTER method. The Direct method is used ONLY when ASA index slides are in the meter. The Computer method is for use with X10 and X100 multiplying slides or when the meter is used without slides.

## THE COMPUTER: (Figures 3 & 4 — Pages 12 and 15)

The Computer consists of 3 dials (2 movable and 1 fixed). On the large movable dial (Figure 3) there are several reference marks. The arrows are for *incident light* readings (Photosphere/Photodisk) and the dots are for *reflected light* readings (Photogrid). Use as follows:



# COMPUTER REFERENCE POINTS

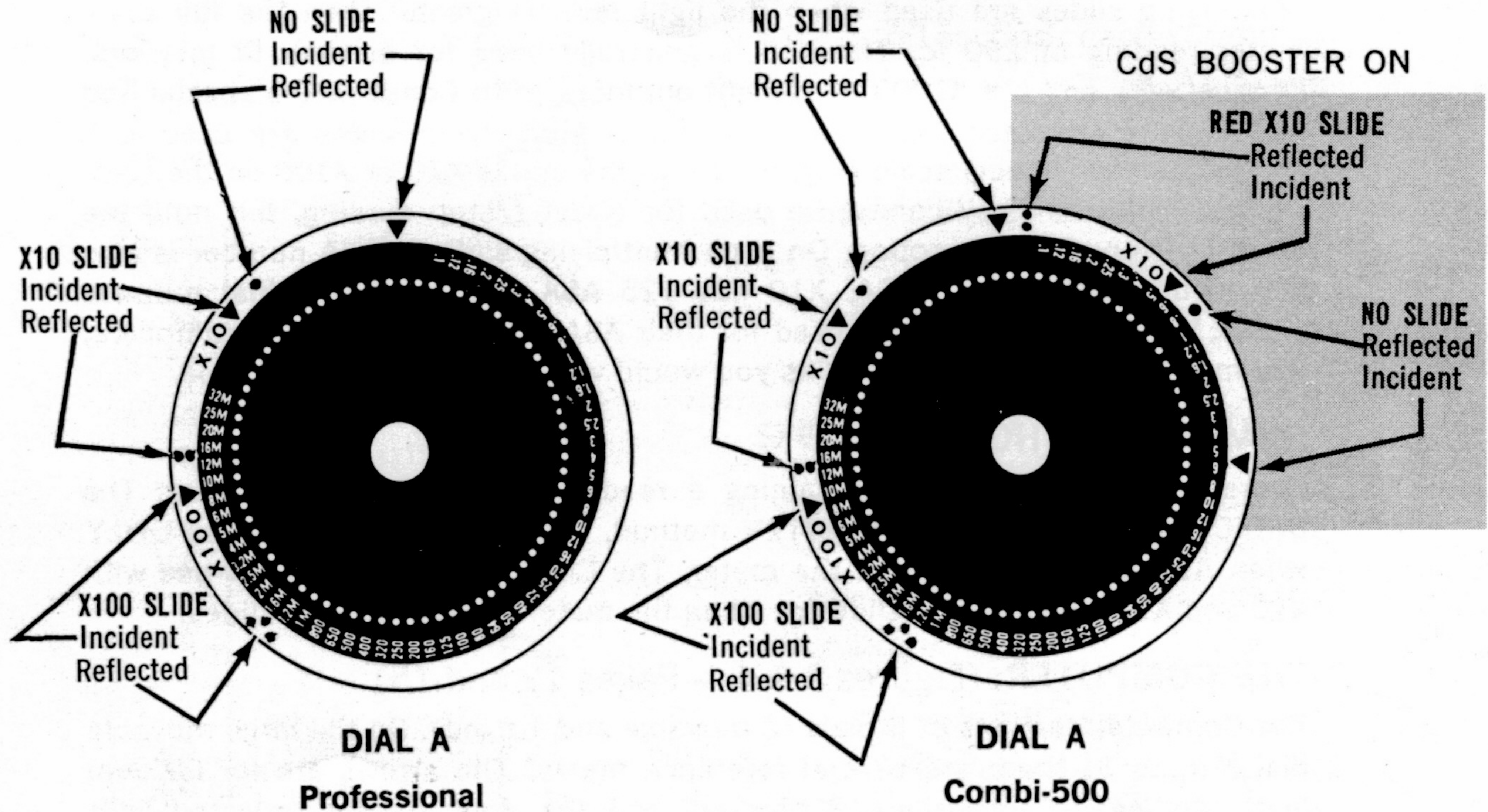


Figure 3



## **ARROWS — (Incident Light)**

**\*Combi Only**

Black Arrow	No slide in.	Red Arrow	Booster on. No slide in.
Black X-10 Arrow	X10 slide in.	Red X10 Arrow	Booster on. Red X10 slide in.
Black X100 Arrow	X100 slide in.		

## **DOTS (Reflected Light with Photogrid):**

**\*Combi Only**

One Black Dot	No slide in.	One Red Dot	Booster on. No slide in.
Two Black Dots	X10 slide in.	Two Red Dots	Booster on. Red X10 slide in.
Three Black Dots	X100 slide in.		

\* Combi users see further instructions page(s) 16-21

The computer center dial ("B" Figure 4) is used for setting film speed. Shutter speeds and cine frames per second are also marked on this dial. Markings are in seconds and fractions thereof. Intermediate speeds on this dial are shown in Figure 4 — Page 15).

The upper dial ("C" Figure 4) shows light values on the top and f/stop on the bottom. Intermediate values on this dial are shown in Figure 4 — Page 15.

## **SET FILM SPEED:**

Hold meter in left hand and line up ASA tab (Figure 1) in ASA window on computer; apply slight upward pressure (with thumb) on ASA tab and rotate knurled disk of computer (with right hand) to bring appropriate film speed into window. Release pressure on tab, film speed is now locked in.



Having taken a reading and noted the light intensity (footcandles):

- 1) Rotate dial A and align appropriate reference point with light value on dial C. (See pages 12 and 15).
- 2) Read off any of the various combinations of shutter speeds and lens openings indicated by the computer.

The Cine scale (Dial B) shows frames per second opposite the lens aperture for those using motion picture cameras.

### **BALANCING THE LIGHT (PHOTODISK):**

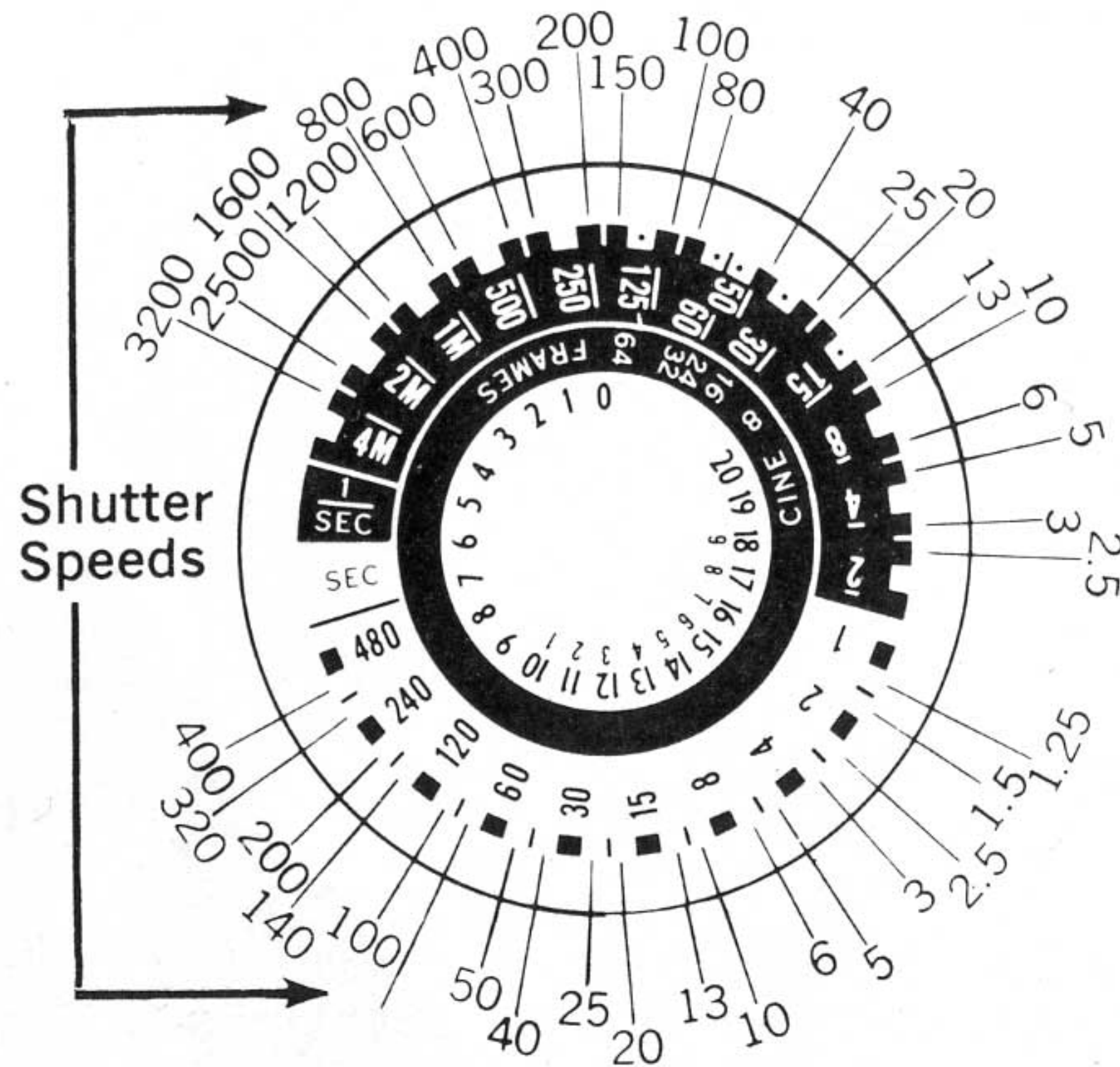
The ratio of highlight to shadow is generally a matter of personal choice. It is easy to achieve any desired lighting contrast with the use of the PHOTODISK on your meter. (See Accessories, Page 22).

- 1) Remove Photosphere and snap Photodisk on meter.
- 2) Insert multiplying slide, if needed (Page 11).
- 3) Hold meter at subject and point Photodisk *directly at key light*. Note intensity (footcandles).
- 4) Hold meter at subject and point Photodisk directly at *fill light*. Note intensity (fc).
- 5) Adjust lighting ratio as needed. Example: Key light reads 32 fc. and the desired ratio is 4:1, adjust fill to read 8 fc.
- 6) Exposure reading is made by replacing disk with Photosphere. Read as usual.

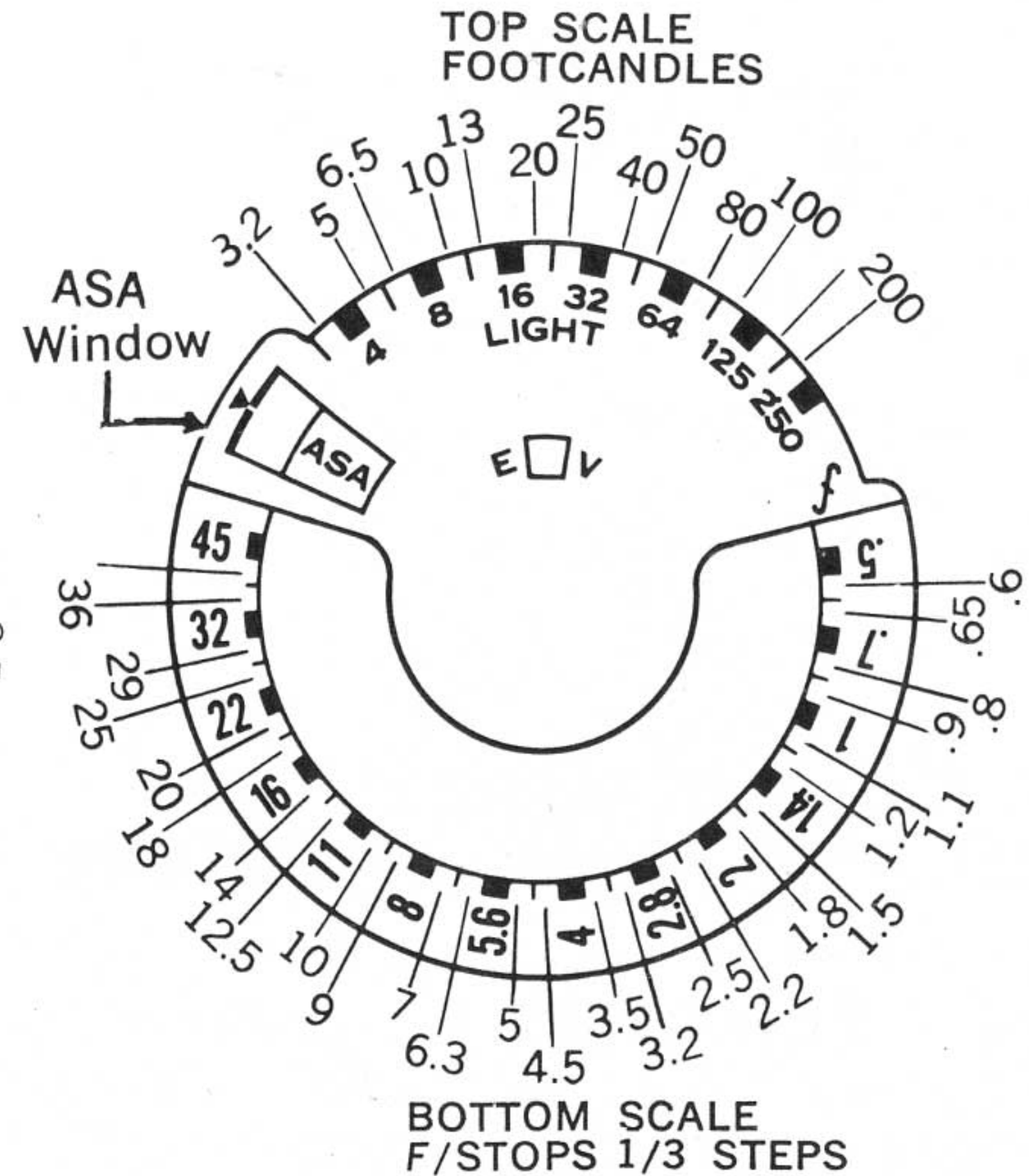


# COMPUTER

## INTERMEDIATE VALUES



**DIAL B**



**DIAL C**

Figure 4



## **COMBI BOOSTER CIRCUIT: (Figure 5 — Page 17)**

When the level of light falls below the normal sensitivity (10 fc. or less) of the COMBI-500, a "boost" of 100 times sensitivity is obtained by switching to the CdS booster circuit. (Figure 5).

The Booster "ON" switch (8) is located at the side of the swivel head. The switch (9) at the top of the swivel head is for checking batteries. Characteristically CdS photocells do not react to light as quickly as Selenium cells, therefore, when using Booster, keep "ON" button pressed for approximately 5 seconds while taking a reading.

## **LOW LIGHT LEVEL PHENOMENA: (CdS Cell)**

When the COMBI-500 is used to read very low light levels, and the blank slide has been in the meter, or the meter has been in its case, it is advantageous to "condition" the CdS cell by exposing it to a light of slightly greater intensity than the one being measured. Due to basic characteristics of the CdS cell, there is a "recovery" time of a few seconds before the reading is stabilized. Where critical measurements are required, repeat the reading after a few seconds interval.



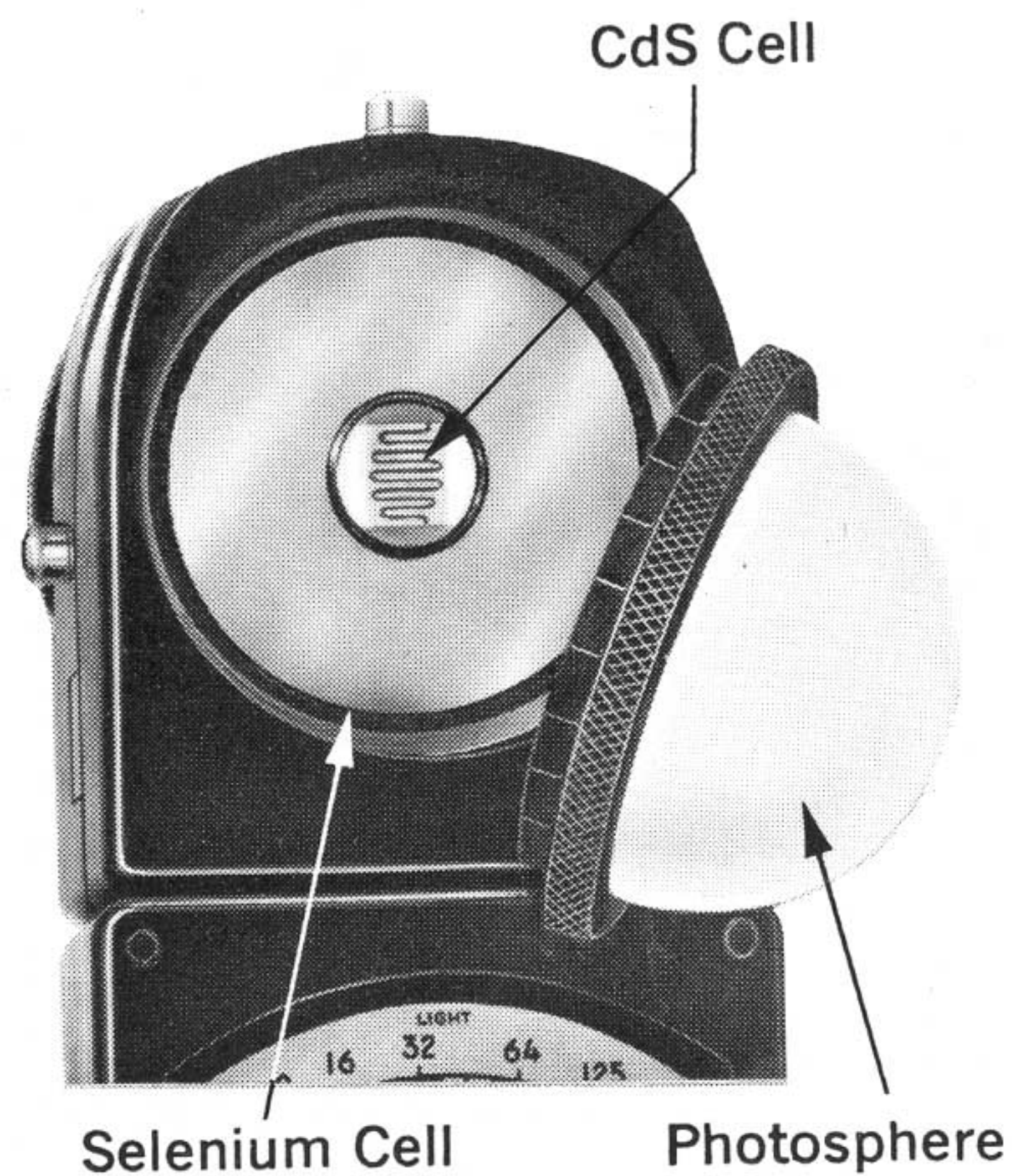


Figure 5



## SENSITIVITY:

### FULL SCALE IN FOOTCANDLES

	PROFESSIONAL	COMBI-500
BASIC RANGE	250	250
WITH X10 MULTIPLIER	2,500	2,500
WITH X100 MULTIPLIER	25,000	25,000
WITH BOOSTER (Combi only)	----	2.5
BOOSTER WITH RED X10 SLIDE	----	25
*WITHOUT PHOTOSPHERE (divide reading by 5 to obtain footcandles.)	50	0.5

\*Emergency procedure only.



## **BATTERY TEST:** (Figure 5 — Page 17)

- 1) Press battery test switch (9).
- 2) Pointer should read at the 64 footcandle mark — or to the right of it — on the meter scale.
- 3) Replace batteries if pointer reads less than 64 fc. mark.

## **REPLACE BATTERIES:**

COMBI-500 Booster uses two 1.34V Mercury batteries (button type), mounted in a spring loaded slot in the swivel head. To replace batteries:

- 1) Push battery holder out (with large coin) of battery slot. (10, FIG. 5)
- 2) Place new batteries in holder. Observe polarity (etched on holder and on batteries).
- 3) Hold meter with photocell facing down.
- 4) Insert battery holder into slot with notched side of holder aligned with “step” in slot.

## **COMBI-500 GG PHOTOREADER:** (See Accessories Page 22)

The SPECTRA GG (Ground Glass) PHOTOREADER utilizes the ultrasensitive CdS cell of the COMBI-500 to measure the actual brightness of the image on the camera ground glass. It may also be used with SLR cameras through the viewfinder.

*Before using the GG PHOTOREADER it is necessary to match it to the equipment in use.*



## **CALIBRATION: (Photoreader)**

1. Make a typical photographic set-up, using the same equipment which will be used with the GG PHOTOREADER.
2. Determine correct exposure in the usual way. (Do not use GG PHOTOREADER for this.)
3. Set computer on the COMBI-500 for correct exposure.

**NOTE: RETAIN THIS "REFERENCE SETTING" THROUGH STEP 8 UNTIL CALIBRATION IS COMPLETED.**

4. Attach GG PHOTOREADER to meter.
5. Open up fully the lens aperture on camera.
6. Hold GG PHOTOREADER firmly against camera ground glass or SLR eyepiece. (Use focusing cloth to exclude extraneous light.)
7. Press CdS switch and note light value (upper meter scale).
8. Locate this same light value on upper dial C of Computer. Opposite this value scribe a reference mark on large movable dial A. (Be sure "REFERENCE SETTING" is still set as in STEP 3.)



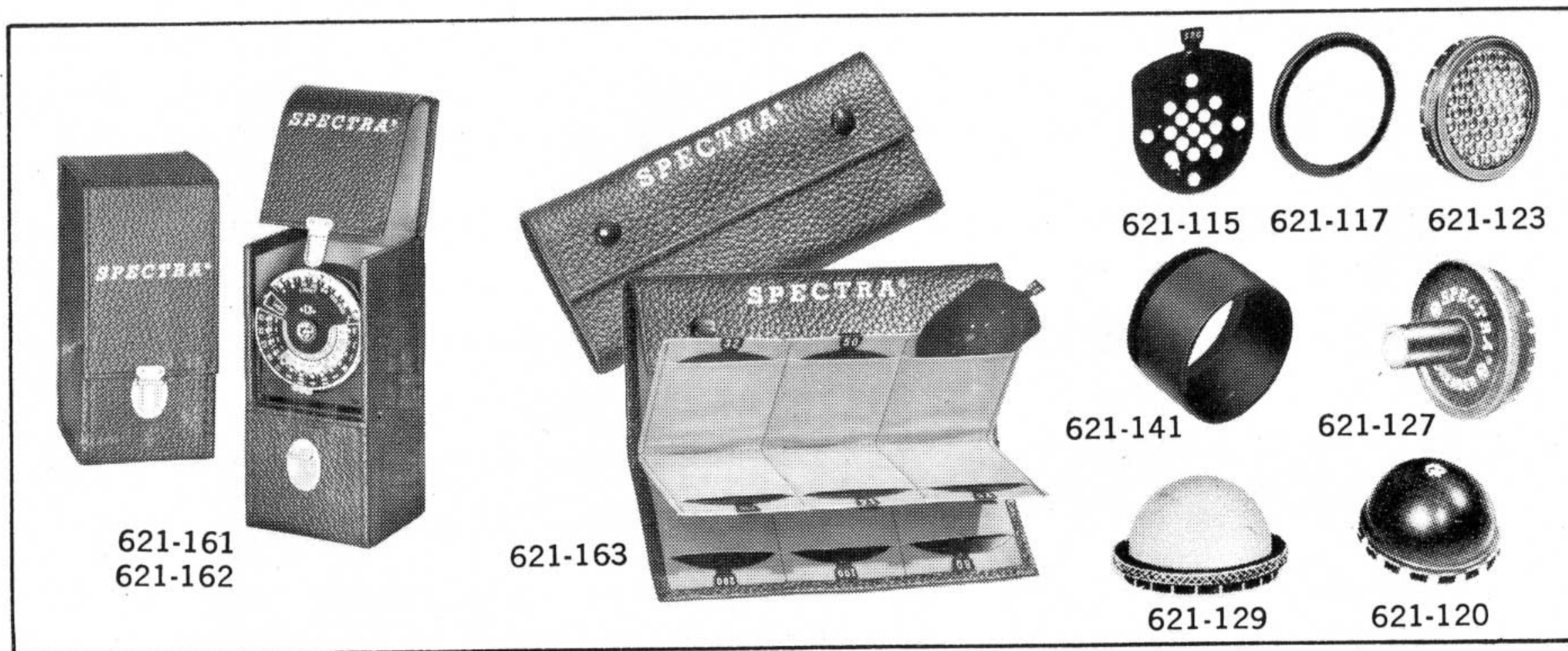
The meter is now calibrated for this particular camera/lens combination. This GG reference mark is valid so long as the equipment remains the same. A new reference mark must be established whenever the lens or ground glass is changed.

## **TO USE THE GG PHOTOREADER:**

1. Hold PHOTOREADER firmly against ground glass or eyepiece. (Use focusing cloth to exclude extraneous light.)
2. Take reading. When the subject has a wide tonal range several "spot" readings may be taken over the ground glass area and then averaged out.
3. On Computer set GG reference mark opposite reading.
4. Read off exposure from computer setting.

Because the GG PHOTOREADER measures the light at the focal plane, it automatically compensates for lens transmission, filters and bellows extensions. The GG PHOTOREADER is particularly useful in the fields of photomacrography, photomicrography, telephotography and the graphic arts.





## PARTS AND ACCESSORIES

621-115 ASA INDEX SLIDES

621-117 PHOTODISK

621-123 PHOTOGRID

621-141 LIGHT HOOD

621-163 SLIDE POUCH

621-161 FIELD CASE (PROFESSIONAL)

621-162 FIELD CASE (COMBI-500)

621-120 PHOTOSHIELD

621-127 GROUND GLASS READER

621-129 PHOTOSPHERE



## **CARE OF THE METER:**

Your SPECTRA meter is a precision pivot and jewel instrument. If used with normal care it will give many years of reliable service. Treat it like any fine precision instrument. Avoid excessive shock or vibration, do not drop, do not store in glove compartment of car, near radiators or other hot places.

When storing COMBI-500 for any extended period, always remove batteries, never leave worn-out batteries in meter.

The words SPECTRA, PHOTODISK, PHOTOGRID, PHOTOSPHERE are registered trade marks of the PHOTO RESEARCH CORP.

## **GUARANTEE:**

SPECTRA meters are guaranteed for one year against all defects of material and workmanship, provided the REGISTRATION CARD accompanying the instrument is filled out and mailed to us within 30 days after purchase.

The guarantee does not cover damage due to accident, misuse or tampering.

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